

## REMARKS

In the outstanding Action, the Examiner rejected claims 1-6, 8 and 10 under 35 U.S.C. § 103(a) as obvious over Best (United States Patent No. 3,948,313) in view of Watkins (United States Patent No. 6,058,979), and rejected claim 11 under 35 U.S.C. § 112 (2<sup>nd</sup> ¶) as indefinite. The Examiner also objected to claims 7, 9 and 12-25 as depending from a rejected independent claim (claim 1), and allowed claims 26-28.

The Examiner also requested the addition of section headings to the specification. All pertinent headings have been added by the amendment above.

As to the rejections, the applicant respectfully submits that the claims present allowable subject matter and, after the above amendment to claim 11, are all in allowable form.

The instant invention is directed to a device for heat insulation of an underwater pipe, of the type used in an oil pipeline, and which is specifically intended to be laid on the sea bed at a great depth (claim 1, lines 1-2; claim 30). The design concerns for an underwater oil pipe are different from those for oil pipes located on or near the surface, especially where the surface is permafrost, the intended environment for the pipes disclosed in Best (see Best, *e.g.* col. 1, lines 11-17). A schematic drawing prepared by the applicant, and showing the structure of Best, is enclosed.

The vastly different operating environments of these two types of pipelines lead to a distinction between the claimed invention and the pipeline disclosed in Best. Specifically, claim 1 (lines 3-6) explicitly requires that the insulating coating comprises a material having a melting temperature  $T_0$  *higher than* the temperature  $T_2$  of the medium surrounding the pipe, i.e. the freezing temperature of sea water, and less than the temperature  $T_1$  of the effluents

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circulating in the pipe. Best, however, describes an insulating liquid 24 having a freezing point of 30°F, which is *less than* the freezing point (32°F) of the medium (permafrost) surrounding the pipe (col. 4, lines 46-64)<sup>1</sup>.

This is an important difference. The main object of Best is to maintain the exterior temperature of the insulated pipeline *below* the freezing point of the surrounding permafrost, so that the permafrost does not melt. Best expressly states that having the melting point of the insulating material lower than the melting point of the surrounding medium is beneficial, as it allows the insulating material to serve more effectively as a heat sink than if the melting point was higher than that of the surrounding medium (see col. 4, lines 59-65). This protects the surrounding medium (permafrost) against melting, which is Best's desired object. Accordingly, despite the Examiner's characterization of Best, the actual teachings thereof do not meet this specific claim limitation.

Thus, Best alone fails to teach or suggest the claimed invention. The addition of Watkins does not overcome these deficiencies. In the first instance, it would not be obvious to one of ordinary skill in the art to combine the teachings of a reference relating to permafrost pipeline structures (Best) with undersea pipeline structures (Watkins) because the considerations of each environment are nearly completely opposite, as described above. The

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<sup>1</sup> The actual quote from the Best specification on this point is:

"A liquid 24 enclosed within the thermocell 18 can be a saline, glycol or other solution sufficient to give the thermocell heat sink a freezing point slightly less than the transition temperature of the surrounding permafrost (usually about 32°C) as, for example, 30°F." col. 4, lines 46-50.

It is evident that the reference to 32°C is a typographical error, and should read "32°F, since a temperature of 32°C would equal 87.6°F, which would be *significantly* higher than the freezing point of liquid 24, and would also lead to the melting of the permafrost, which would defeat the entire purpose of the Best device: to keep the temperature of the pipeline *lower* than ambient temperature, to avoid melting the permafrost. Additionally, Best consistently refers to °F in

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Examiner cites Watkins, in fact, solely for the use of thermoplastic materials in pipelines, but does not suggest that Watkins contains any teachings that would enable one of ordinary skill in the art to deviate from Best's express teachings regarding the use of insulating materials having temperatures *lower than* the ambient material's melting point.

Thus the references, either alone or in combination, fail to teach or suggest the invention as claimed. Withdrawal of this rejection is therefore respectfully solicited.

In addition, the limitations of claim 2 are not fairly met by Best and Watkins, either alone or in combination. Claim 2 requires that the insulating coating comprises an absorbent matrix which is impregnated with the incompressible liquid/solid phase changing material. The Examiner has cited "matrix 22" of Best as meeting this limitation (Office Action, pages 4-5), but it is respectfully submitted that this is not the case.

Core structure 22 of Best is not an absorbent matrix, but rather the structure which separates the two skins of thermocell 18 to permit liquid 24 to flow therethrough (see col. 4, lines 29-31). This element is therefore not a matrix impregnated with a liquid/solid phase change material as called for in claim 2. It is therefore respectfully submitted that this rejection, too, should be withdrawn, and that claim 2 is allowable for this independent reason.

Turning to the §112 rejection of claim 11, the applicant has removed the dual-range ambiguity from claim 11, and added a new claim 29, depending from claim 11. Claim 29 contains the (second) narrowing range deleted from claim 11 by the above amendment.

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the remainder of the specification, and does not refer to °C at any other location.

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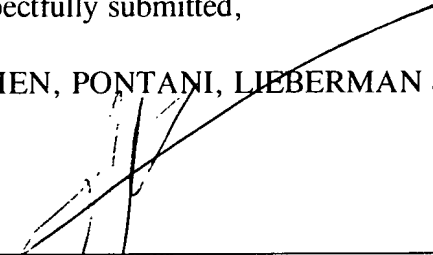
For all these reasons, therefore, it is respectfully submitted that the claims present allowable subject matter, and are in allowable form. Early and favorable action towards that end is respectfully solicited.

It is believed that no fees or charges are required at this time in connection with the present application; however, if any fees or charges are required at this time, they may be charged to our Patent and Trademark Office Deposit Account No. 03-2412.

Respectfully submitted,

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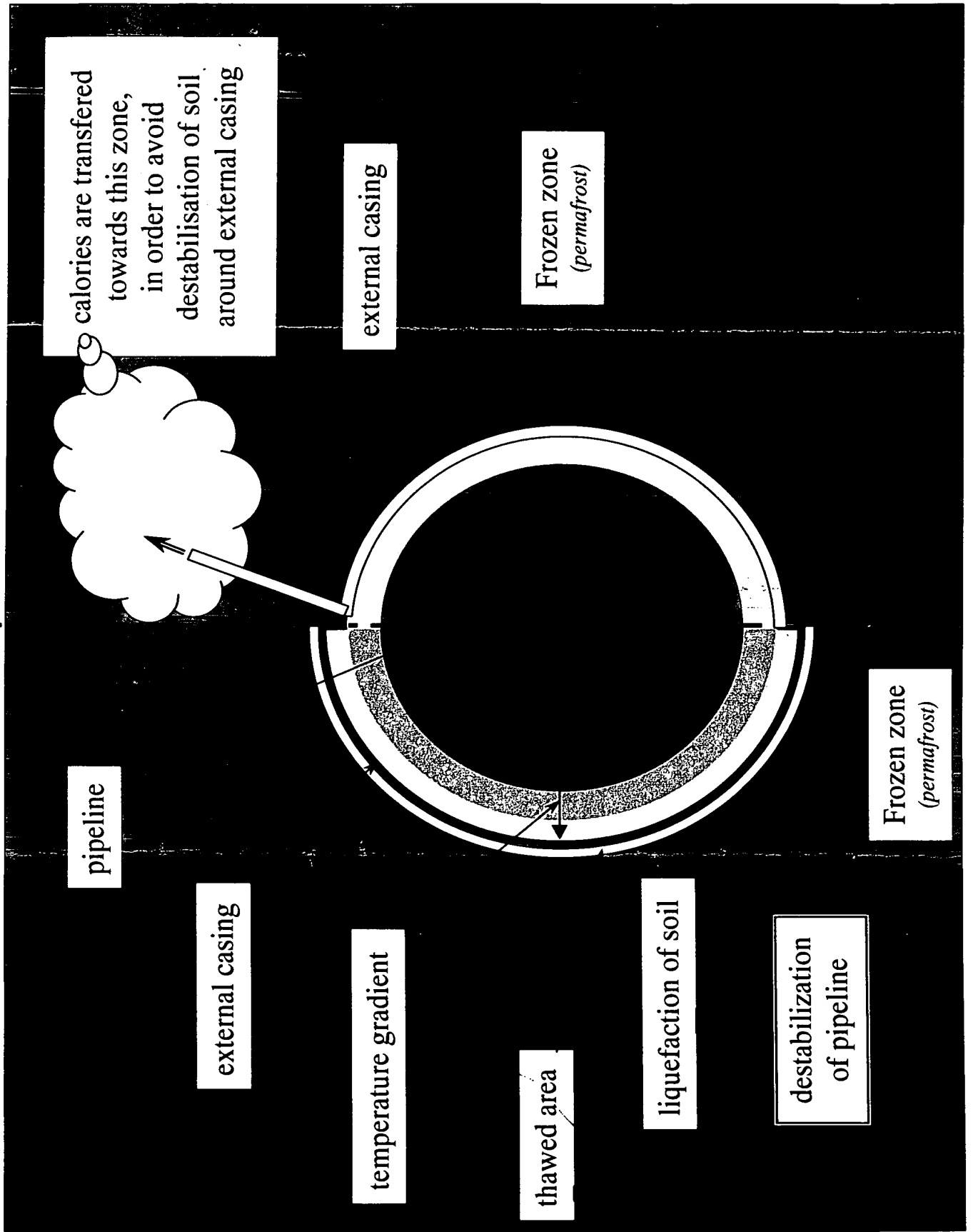
**MARKED UP COPY OF CLAIMS**

11. (Twice Amended) Device according to claim 1, characterized in that said virtually incompressible material (4) is constituted, to at least 90%, of chemical compounds of the family of alkanes [preferably a paraffin comprising a hydrocarbon chain with at least 10 carbon atoms].

29. (New) Device according to claim 11, wherein said incompressible material (4) is a paraffin comprising a hydrocarbon chain with at least 10 carbon atoms.

30. (New) Device according to claim 1, wherein said at least one underwater pipe is disposed on said sea bed.

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